**Solar Energy Challenge Project**

**YOUR CHALLENGE: Build a solar powered heater that can heat 1 liter of water.**

**There will be three objectives:**

* **Heat to the highest temperature possible in one hour!**
* **Heat water the fastest over the first 20 minutes**
* **Maintain the highest temperature 30 minutes after test.**

Your challenge is to build a solar powered heater that can heat 1 liter of water and fulfill the three objectives more effectively than your classmates. You can use any materials from the lab, from home, or the recycling station at school (some suggestion materials: cardboard, aluminum foil, black paint). Solar energy is the only form of energy that can be used to heat the water. There will be a prize for the team(s) that achieve each objective.

**Part 1: Research thermal solar power designs, plan your design, and hypothesize**

* Look for thermal solar designs online to see what strategies professionals use to heat and maintain the temperature of water.
* Thoroughly plan a “blueprint” design for your solar powered water heater. Include list of materials, a brief explanation of how your design will work, and a hypothesis of final temperature you will achieve. **(Due 5/4 at the end of class).**

**Part 2: Construct your solar powered water heater.**

* Construct your solar powered water heater.
* Plan for speed of heating, total heating and temperature maintenance.
* Describe and persuade an “audience” why this design is the best for achieving all three objectives with solar power (***Individual* Due 5/10 at the beginning of class**).

**Part 3: Test your solar powered water heater in the field, track data, and graph results**

* Find a spot outside where you will place your solar powered water heater.
* Track the temperature of the water every five minutes for a one-hour period.
* Record your results.

**Part 4: Evaluate the results of the test and reflect**

* Review your results and do a comparative study to the other teams in the class.
* What was different from your design and the team who got their water to the highest temperate (If you are the team the got the highest temperature, what was different about your design from the others)? How could you improve your design to make it collect more energy (if applicable)? (**Analytical data, graph, and comparative study** **Due 5/12**)

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| **Due Date** | **Pacing: Deadlines for completion** |  |
| Wednesday 5/3 | Research different solar designs online. Plan your design, make a list of needed materials and write your hypothesis. |  |
| Thursday 5/4 | **“Blueprint” and hypothesis are due at the end of class (Group).** Work on collecting material for your solar powered water heater if you finish early! |  |
| Friday 5/5 | Begin constructing your solar powered water heater. |  |
| Monday 5/8 | Work on constructing your solar powered water heater. Construction must be completed by the end of class. |  |
| Wednesday 5/10 | **Persuasive argument on why your design is the best is due at the beginning of class (Individual).** Test your solar powered water heater in the “field,” tracking the temperature of the water every ten minutes for a one-hour period. |  |
| Thursday 5/11 | Review your results create a digital log of data (table, graph, mode, median, mean) and compare them with the other teams in class. Begin comparative study. |  |
| Friday 5/12 | **Graphs and table of results are due at the beginning of class (Group).** Write individual reflection and comparative study. **Individual reflection/comparative study due at end of period. (Individual)** |  |